

## Multifunctional Serial to Ethernet converter

(USR-TCP232-E)(USR-TCP232-ED)  
(USR-TCP232-400)(USR-TCP232-401)  
(USR-TCP232-500)(USR-TCP232-504)  
(USR-TCP232-52E)(USR-TCP232-52PE)

File version: V1.3.2



Jinan USR IOT Technology Co., Ltd. works on LAN and WAN and wireless for MCU to Ethernet Solutions, Ethernet, WIFI, GPRS, Zigbee and Wireless modules, we can supply custom design for those usage, looking forward to cooperate with you.

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## 1. Introduction

### 1.1. Overview

The USR-TCP232-E45 is an intelligent plug-and-play RS232 to Ethernet adapter that enables any device or machine with a serial port, to become Ethernet network and Internet enabled. Go from Ethernet to serial with the USR-TCP232-E45. It features a powerful built-in device server, so you can access your serial device from anywhere in the world over internet! The USR-TCP232-E45 is easily configured via Ethernet, and can also be set up through the serial port and web pages.

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### 1.2 Features

1. New Cortex-M3 kernel, industrial working temperature range, elaborate optimization TCP/IP protocol stack, stable and reliable.
2. A RS232 port, can set COM port and working mode independently, work independently, support RTS/CTS hardware flow control.
3. A RS232/RS485 compatible port, auto adaptation.
4. RS232 and RS485 can be used together, work independently, distinguish the connected serial port via port number.
5. Auto-MDI/MIDX function, discretionarily connect cross-over or direct network cable, automatic switching.
6. Support TCP Server, TCP Client, UDP, UDP Server, HTTPD Client various of work modes.
7. Support virtual serial work way, provide corresponding software.
8. Serial port highest baud rate from 110bps to 1024000bps(COM0 only max 256000bps).
9. wide voltage input, more applications.
10. Support DHCP automatically access IP, can inquire the facility within network through the UDP broadcast protocol.
11. Supply the protocol for VIP customers, can integrate parameter setting function to users' software applications.
12. Provide PC TCP/IP SOCKET programming example, VB, C++, Delphi, Android, IOS.
13. The built-in web page, also parameter setting via web, can customize web pages for users.
14. Can also set via UDP, provide the set up protocol and software source code.
15. Reload button, a key restore default Settings.

16. RJ45 status indicator light, RJ45 interface built-in isolation transformer, 2 KV isolation.
17. The global only MAC address bought from IEEE, the user can define MAC address (please state when you make order).
18. Support upgrade firmware via network.
19. Support IP and domain name at the same time
20. Support up to 4 link from client when act as TCP Server, send and receive data with id.
21. Can modify MAC address you wanted.
22. Can modify http server port for module built-in http server.
23. Support Keepalive.

## 1.2. Applications

- Fire and Security Panels
- Vending Machines
- Point of Sale Terminals
- Remote equipment management
- IT management services
- Access Control
- Industrial Control
- Home Automation
- Instrumentation
- Building Control
- Power Management

## 1.3. Order information

Type	Part Numbers	Electric interface
Serial to Ethernet Converter	USR-TCP232-E	2 * TTL232
Serial to Ethernet Converter	USR-TCP232-ED	3 * TTL232
Serial to Ethernet Converter	USR-TCP232-400	1 * RS232, 1 * RS485/RS422
Serial to Ethernet Converter	USR-TCP232-401	1 * RS232, 1 * RS485
Serial to Ethernet Converter	USR-TCP232-500	2 * RS232, 1 * RS485/RS422
Serial to Ethernet Converter	USR-TCP232-504	3 * RS485
Serial to Ethernet Converter	USR-TCP232-52E	2 * RS232, 1 * RS485, 2 * RJ45
Serial to Ethernet Converter	USR-TCP232-52PE	2 * RS232, 1 * RS485, 2 * RJ45(POE)

Diagram 1-1 Order information

Note:

For webpages: PORT0, PORT1 and PORT2, represent below:

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TCP232-E:	PORT0 represent UART0, PORT1 represent UART1, PORT2 not available in hardware;
TCP232-ED:	PORT0 represent UART0, PORT1 represent UART1, PORT2 represent UART2;
TCP232-400/401:	PORT0 represent RS232, PORT1 represent RS485, PORT2 not available;
TCP232-500:	PORT0 and PORT1 represent RS232_0 and RS232_1, PORT2 represent RS485/422;
TCP232-504:	PORT0, PORT1, PORT2 represent RS485_0、RS485_1 and RS485_2;
TCP232-52E/52PE:	PORT0 and PORT1 represent RS232_0 and RS232_1, PORT2 represent RS485

## 1.4. Electrical characteristics

DC Power Supply Voltage:

Two DC Voltage can be choose (for USR-TCP232-E, others see Hard interface)

VCC: type: 3.3V, min: 3.15, max: 3.45 V

VDD: type: 5V, min: 4.5V, max: 5.5V

Operating supply current : Max: 180 MA

Operating Temperature: -40~85 °C

Storage temperature: -40~85 °C

## 2. Work Mode

### 2.1. Block diagram

Take USR-TCP232-E for example, show demo application of module USR-TCP232-E.

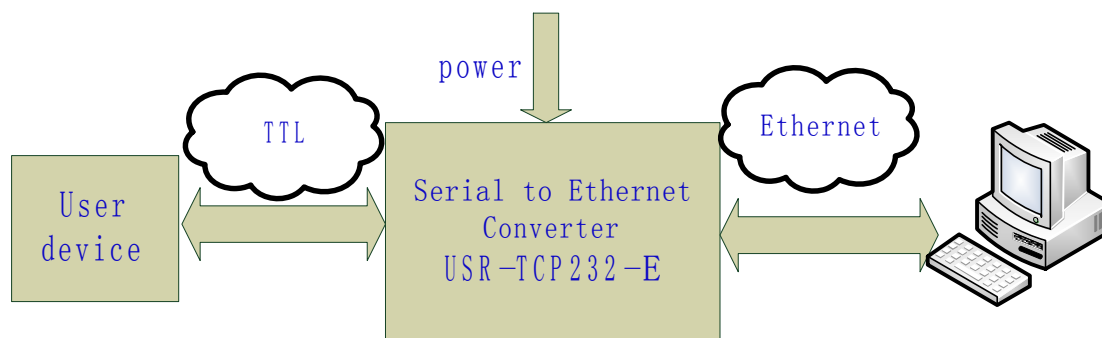
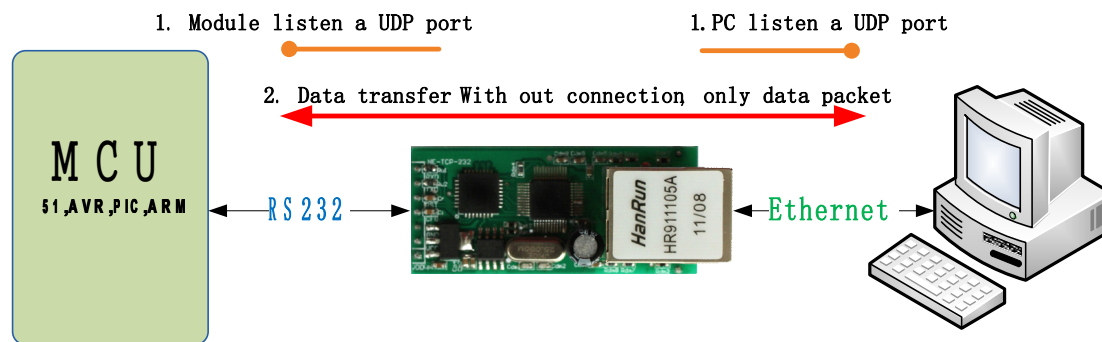


Diagram 2-1 USR-TCP232-E application demo

### 2.2. UDP mode

When in UDP mode, after power on, module listen on specific port.



Module work at UDP mode

Diagram 2-2 UDP mode

When received data from this udp port, send it to serial port; otherwise, when data is received from serial port, send it to ethernet.

The assist software can be download from link below:

<http://www.usr.so/Download/121.html>



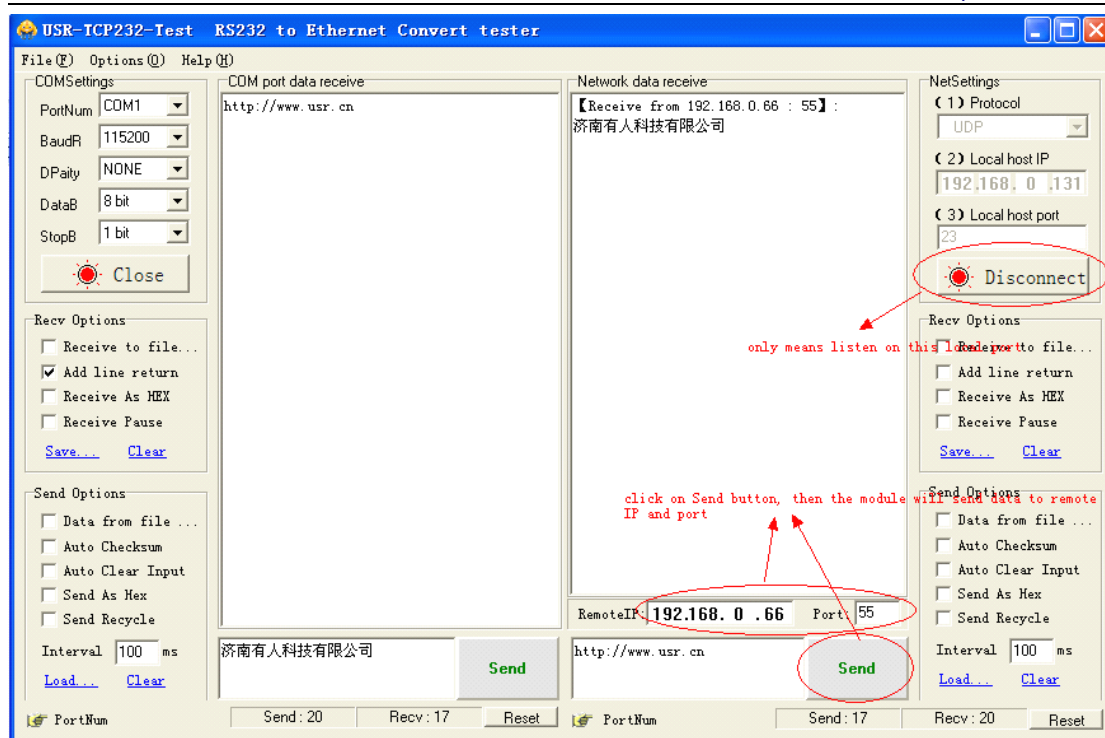


Diagram 2-3 UDP mode communication test

Note:

- 1) local port and remote port can be different.
- 2) Max UDP send length(ethernet to serial) is 1472 bytes. If you want to send more than 1472 Bytes, please div it into shorter packet.

## 2.3. TCP Client mode

Open web pages and config module to

Telnet Mode: TCP Client

Remote port number: 23

Telnet Server Addr: 192.168.0.131

	Current	Updated
Baud Rate:	115200bits/second	115200 bits/S
Data Size:	8 bits/character	8 bits/character
Parity:	None	None
Stop Bits:	1bit(s)	1 bit(s)
Flow Control:	None	None
Local Telnet Port Number:	23	23
Remote Telnet Port Number:	N/A	23
Telnet Mode:	TCP Server	TCP Client
Telnet Protocol:	Raw	Raw
Telnet Server Addr:	N/A	192.168.0.131
Telnet Timeout:	0seconds	0 seconds (< 256, 0 for no timeout)
UART packet Time:	10ms	10 ms (< 256)
UART packet length:	200	200 chars (< 1024, 0 for no use)

☒ Save these as next startup defa

Diagram 2-4 TCP Client mode

Use USR-TCP232-Test,

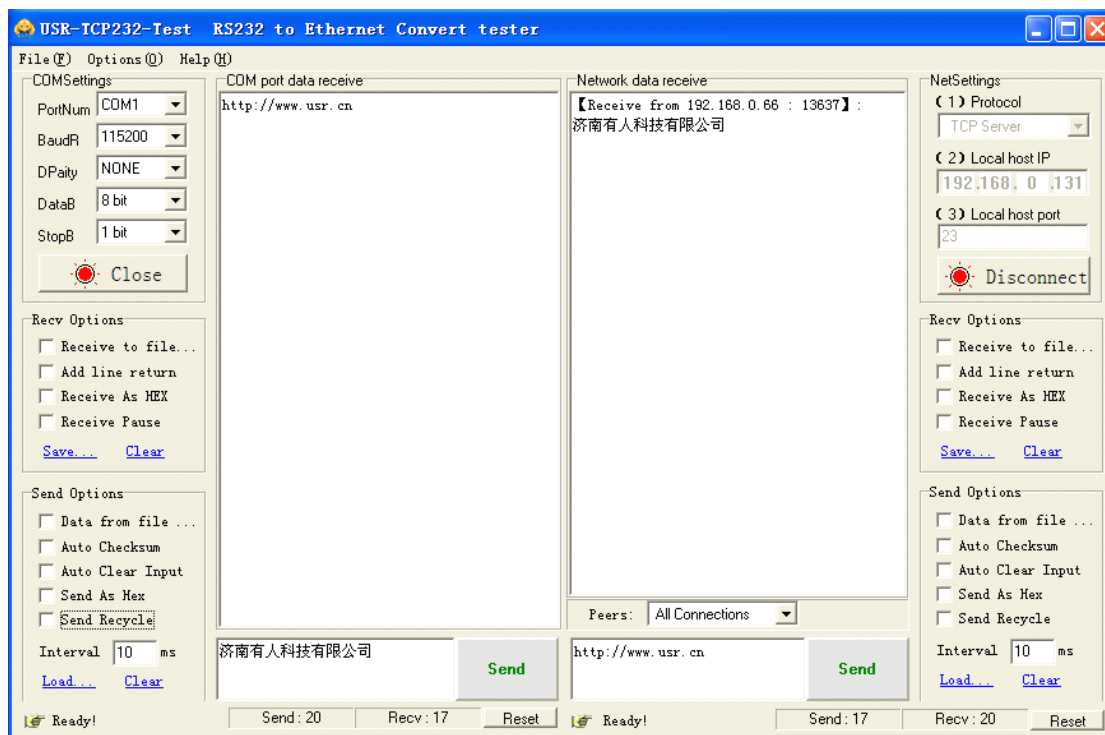


Diagram 2-5 TCP Client communication test

## 2.4. UDP Server mode

Like the socket UDP server in pc API. Many to one data transfer supported, the data from uart/232/485 part will be transformed to the last UDP packet's address.

Here show 2 UDP client communicate with server, server send data to the last client communicates with it.

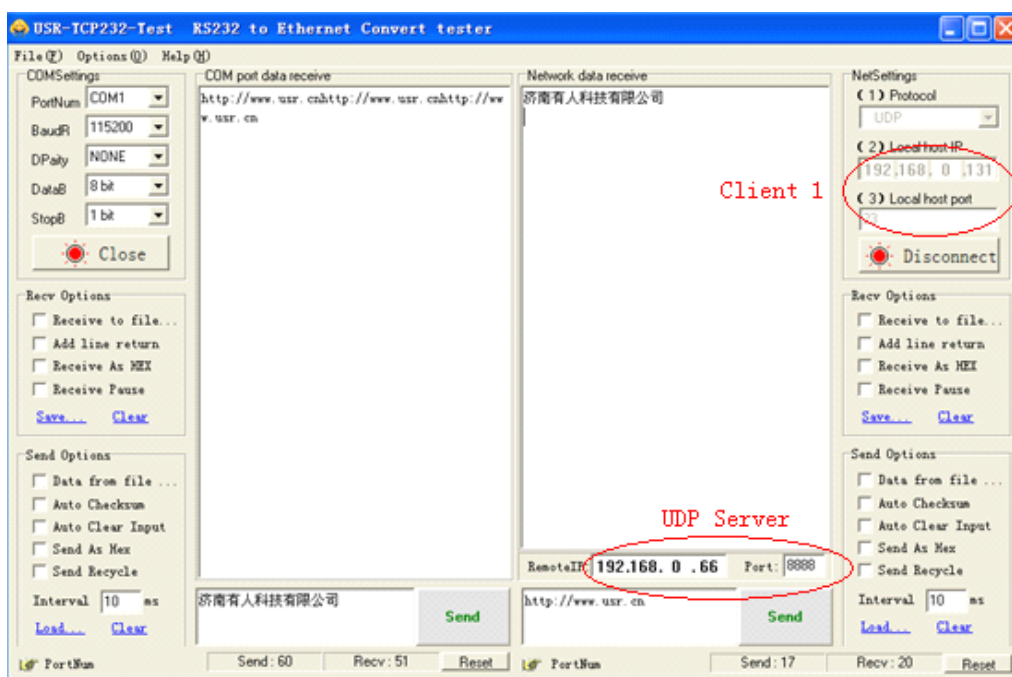


Diagram 2-6 Client 1 &lt;-&gt; server

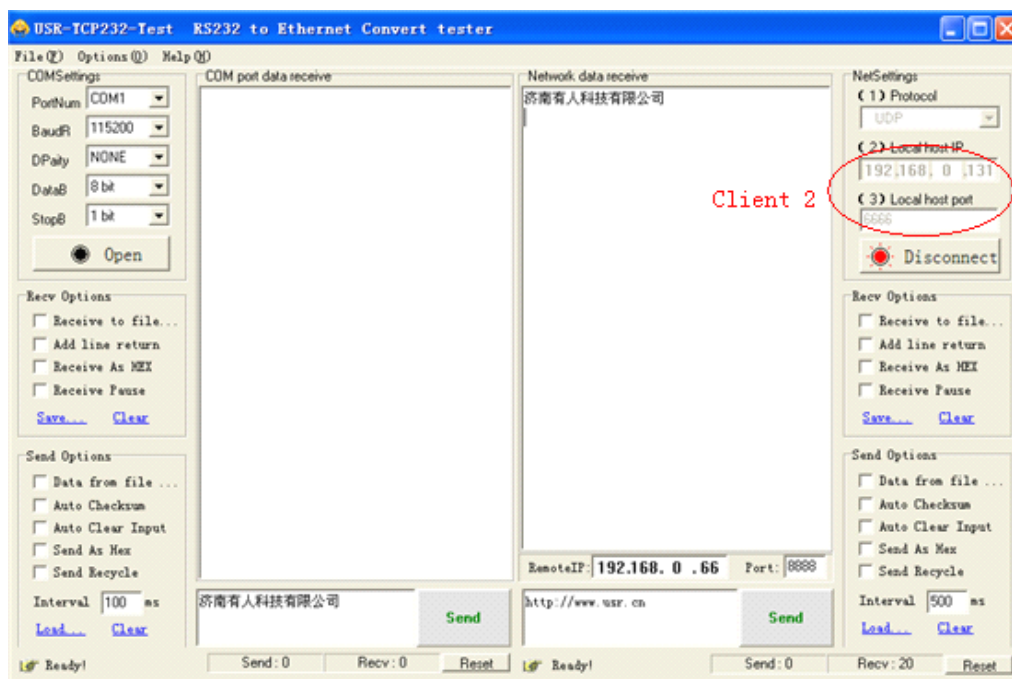


Diagram 2-7 Client 2 &lt;-&gt; server

## 2.5. TCP Server mode

TCP Server mode have 2 parameters: max link number and link type

1. max link number: 1 ~ 4;
2. Link type: typical, completely transparent, send data to all client;

extend1, communicate with id, otherwise abandon;

extend2, communicate with id, otherwise send to all client.

For link type extended 1 and extended 2:

When receive data from ethernet, module will send data to serial port with head 'I' 'N', followed by data. 'I' represent incoming data, 'N' represent client index.

When user MCU want send data to module serial port, start with head 'O' 'N' data... 'O' represent send out, 'N' represent which client.

When new TCP connection incoming, module will send 'C' 'N' 'M' to serial port, indicating that there is current link 'N' accessed, total link number 'M'.

When link number have exceed maximum, new link requirment will lead to message 'F' 'F'.

When disconnect, module will send 'D' 'N' 'M', represent current link N is delete, left link M.

#### Note:

serial data need to be sent in one package to module.

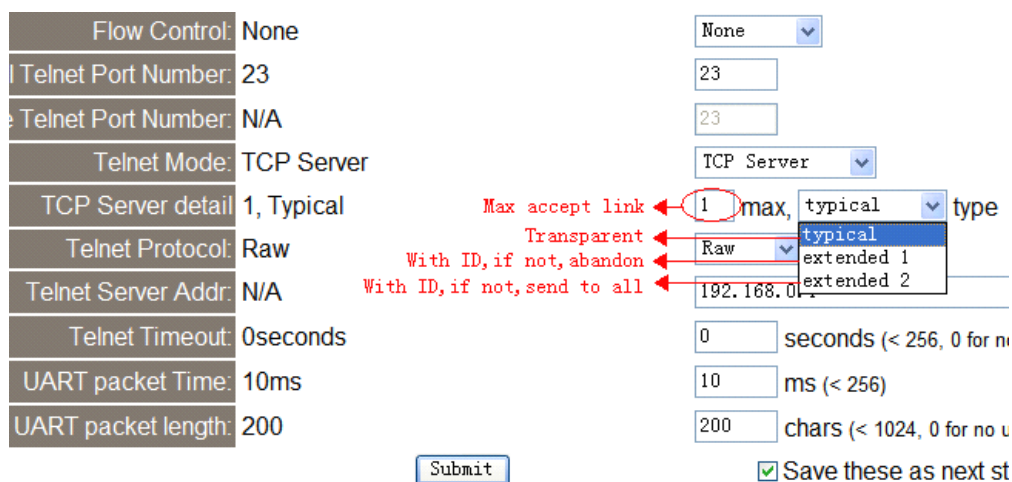


Diagram 2-8 web page configuration

## 2.6. Httpd Client mode

This function is easier used for web page developer. We establish one web server page, add this:

```
[<?php echo $_GET['data']; ?>]
```

Means we can GET data from HTTP client's request. Open this URL:

[www.usr.cn/1.php?data=12345](http://www.usr.cn/1.php?data=12345), the web page is downbelow, we can see that the web server have got the data(12345),

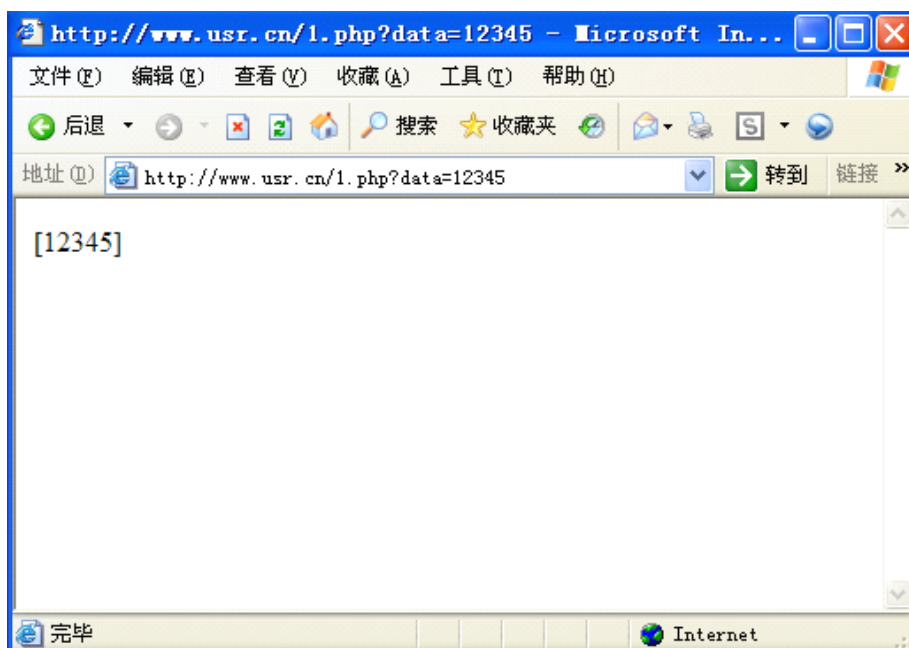


Diagram 2-9 Request **www.usr.cn/1.php?** and upload data

Then we take another way, set USR-TCP232-E module Work mode HTTPD Client, Target address **www.usr.cn**, Target port 80,

Data Size:	8 bits/character	8 bits/character
Parity:	None	None
Stop Bits:	1bit(s)	1 bit(s)
Flow Control:	None	None
Telnet Port Number:	23	23
Telnet Port Number:	80	80
Telnet Mode:	Httpd Client	Httpd Client
Telnet Protocol:	Raw	Raw
Telnet Server Addr:	180.186.12.170	www.usr.cn
Telnet Timeout:	0seconds	0 seconds (< 256, 0
UART packet Time:	10ms	10 ms (< 256)
UART packet length:	200	200 chars (< 1024, 0 f
<input type="button" value="Submit"/>		<input checked="" type="checkbox"/> Save these as n

Diagram 2-10 config HTTPD Client

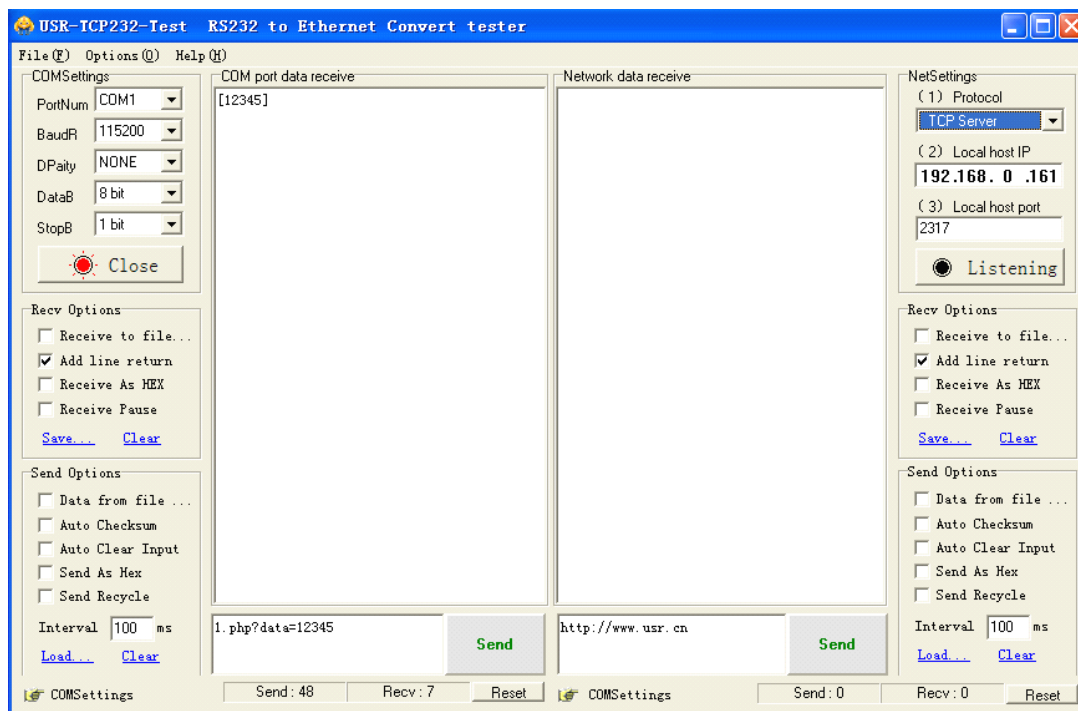


Diagram 2-11 module act as HTTPD Client

Note.

HTTPD Client based on TCP Client.

## 2.7. TCP Auto mode

When power on, module work as TCP Server, listen on local port, but if there is data received from serial port before any connection, module will try to connect remote IP and port as TCP Client.



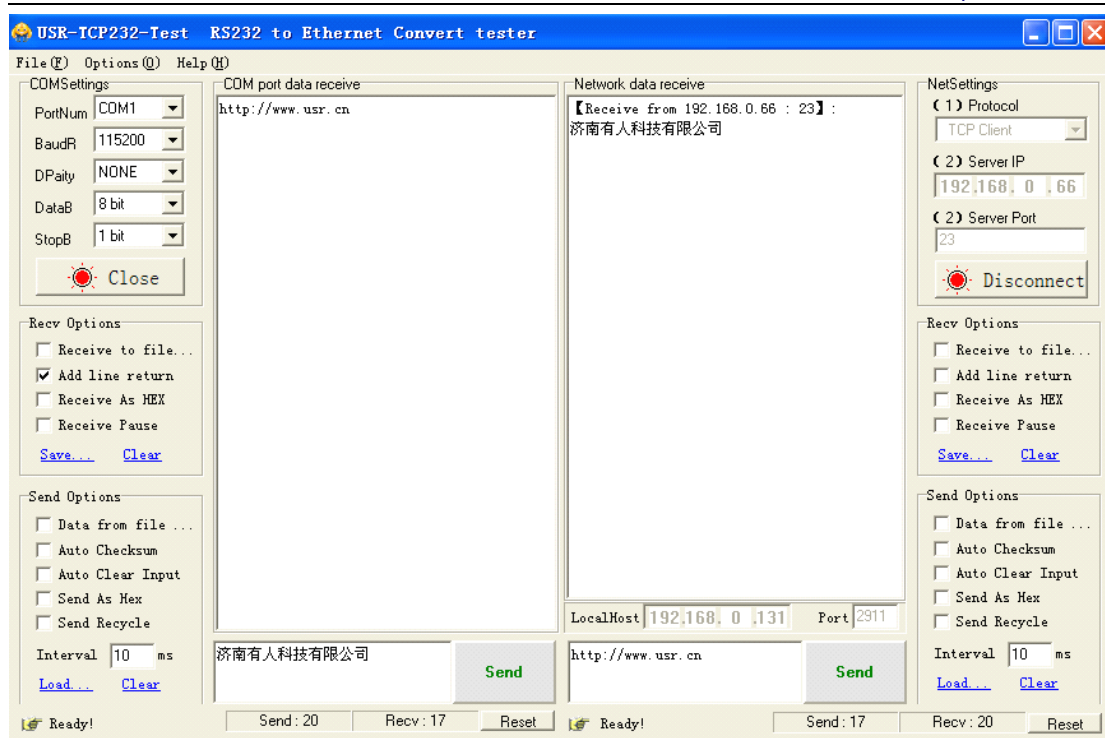


Diagram 2-12 TCP Auto act as Server

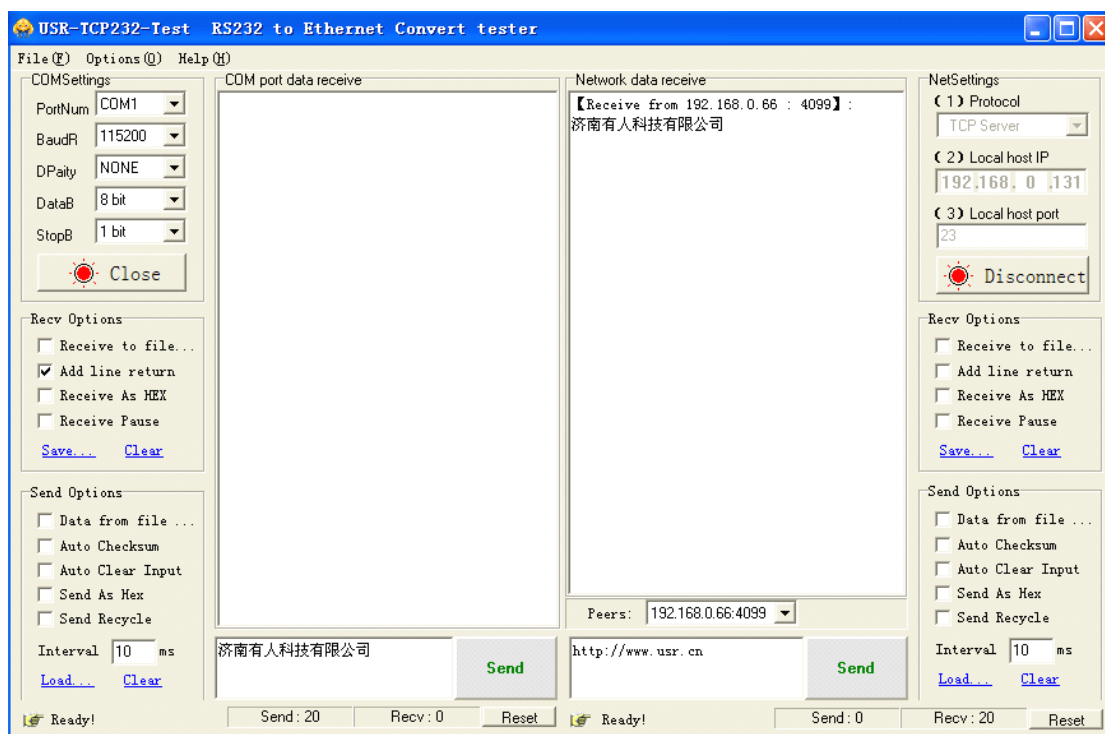


Diagram 2-13 TCP Auto act as Client

## 2.8. WEB to Serial mode

Communication mode between serial port and web pages.

	Current	Updated
Baud Rate:	115200bits/second	115200 bits/S
Data Size:	8 bits/character	8 bits/character
Parity:	None	None
Stop Bits:	1bit(s)	1 bit(s)
Flow Control:	None	None
Local Telnet Port Number:	23	23
Remote Telnet Port Number:	N/A	23
Telnet Mode:	Web to Serial	Web to Serial
Telnet Protocol:	Raw	UDP Mode
Telnet Server Addr:	N/A	TCP Client
Telnet Timeout:	0seconds	UDP Server
UART packet Time:	10ms	TCP Server
UART packet length:	200	Httpd Client
		Web to Serial (< 256, 0 for no timeout)
		10 ms (< 256)
		200 chars (< 1024, 0 for no use)

Submit

☒ Save these as next startup default setti

Diagram 2-14 config module to WEB to Serial mode

Select Telnet mode Web to Serial,

UART0 UART1 UART2

www.usr.cn send read

☐ Operation in HEX mode  
☒ Auto Read every 1 Seconds

up down left right enter

n1 n2 n3 n4 n5

n6 n7 n8 n9 n0

Note: Max send 32 bytes one time.

Receive window:  
www.usr.cn

clear

文件(F) 选项(O) 帮助(H)

串口设置

串口号 COM1

波特率 115200

校验位 NONE

数据位 8 bit

停止位 1 bit

关闭

接收区设置

☐ 接收转向文件...

☐ 自动换行显示

☐ 十六进制显示

☐ 暂停接收显示

保存数据 清除显示

发送区设置

☐ 启用文件数据源...

☐ 自动发送附加位

☐ 发送完自动清空

☐ 按十六进制发送

☐ 数据流循环发送

发送间隔 2000 毫秒

文件载入 清除输入

发送: 10 接收: 10 复位计数

Diagram 2-15 WEB to Serial communication demo

Note:

- 1、received window show data only when click on “read” button or select “Auto read”button.



2、whether WEB to Serial mode or not, send web data to serial always work.

### 3. Hardware interface:

#### 3.1. USR-TCP232-E

About the new PCB libraries file, we can load from website.

##### 3.1.1. Hardware

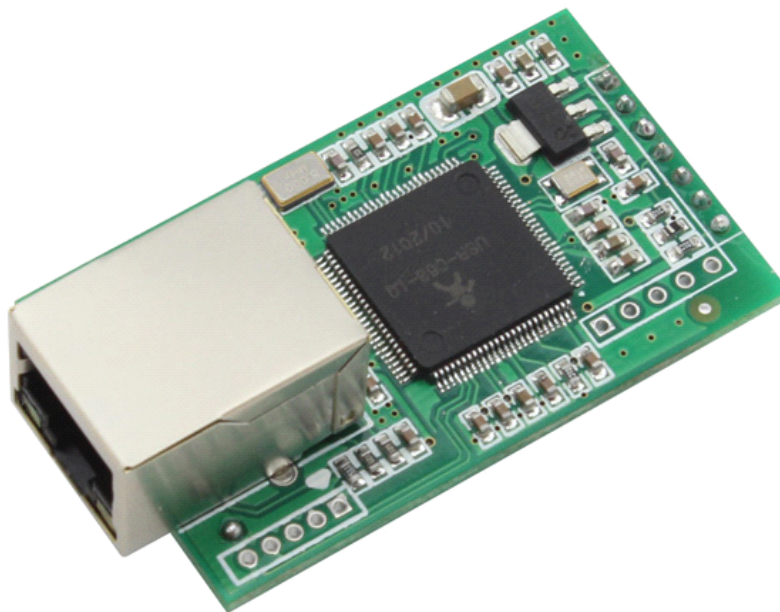


Diagram 3-1 USR-TCP232-E

- 1) Mechanical dimension: (L×W×H): 55×30×23.2(mm) including RJ45 and connector;
- 2) PCB dimension(L×W): 50.4×30.0(mm);
- 3) 5V 3.3V double power input, choose 1 input
  - 1) 2 \* serial(2 \* TTL)
  - 2) TTL serial port support hardware flow control

##### 3.1.2. Power

Power supply socket, The input voltage range 3.3V or 5V, current 150 MA. We default supply high quality 5 V / 1 A power adapter.

### 3.1.3. LED status

Except for Link and Data of RJ45, there is one work LED interface

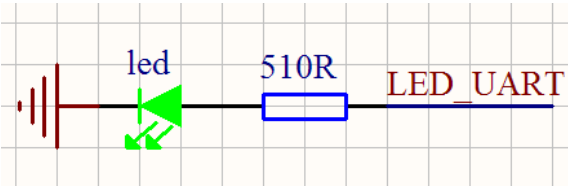
ID	name	Description
1	Work	<p>Just interface, have no LED on module, If you needed, take this pin with LED and 510 ohm resistor to GND. See Pin8 for further explantion.</p> 
2	Link(green)	On RJ45, when ethernet link established, on.
3	Data(yellow)	On RJ45, wnen ethernet data communicate, twinkle.

Diagram 3-2 LED definition

### 3.1.4. Serial(TTL) interface

The serial port is TTL level (2 \* TTL serial port, can be directly connected to MCU).

number	name	Description
1	TXD0	Uart0 transmit data pin
2	RXD0	Uart0 receive data pin
3	CTS0	Uart0 RS232 clear to send
4	RTS0	Uart0 require to send
5	RXD1	Uart1 receive data pin
6	TXD1	Uart1 transmit data pin

Diagram 3-3 connector interface(include uart0 and uart1)

## 3.2. USR-TCP232-ED

### 3.2.1. Hardware

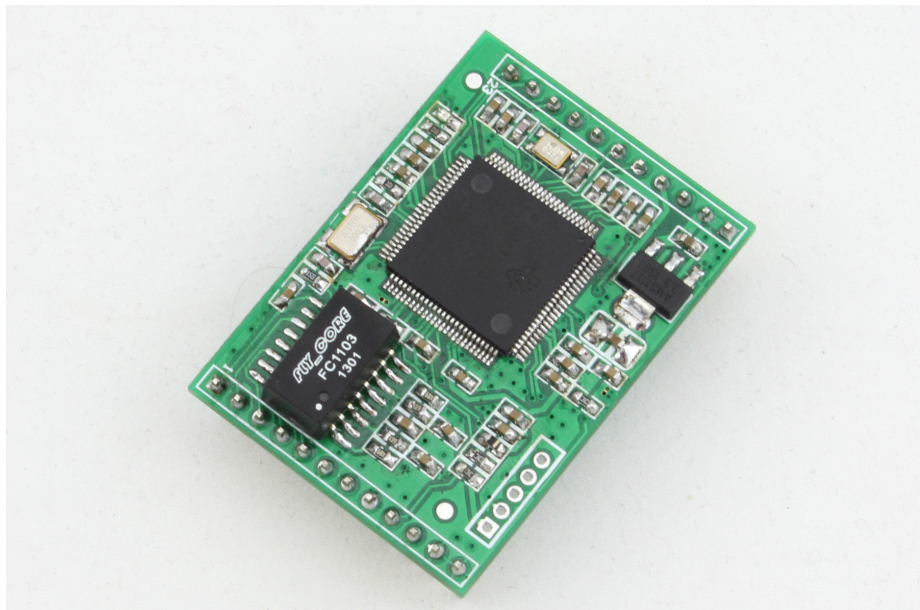


Diagram 3-4 USR-TCP232-ED

- 1) Mechanical dimesion: (L×W×H): 44.45×31.75×15.4(mm) including RJ45 and connector;
- 2) PCB dimension(L×W): 44.45×31.75(mm);
- 3) 5V 3.3V double power input, choose 1 input
- 4) 3 \* serial(3 \* TTL)
- 5) TTL serial port support hardware flow control

### 3.2.2. Power

Power supply socket, The input voltage range 3.3V or 5V, current 150 MA. We default supply high quality 5 V / 1 A power adapter.

### 3.2.3. LED status

Except for Link and Data of RJ45, there is one work LED interface

ID	name	Description
1	Work	Twinkle every 1 seconds
2	Link(green)	On RJ45, when ethernet link established, on.
3	Data(yellow)	On RJ45, wnen ethernet data communicate, twinkle.

Diagram 3-5 LED definition

### 3.2.4. Serial(TTL) interface

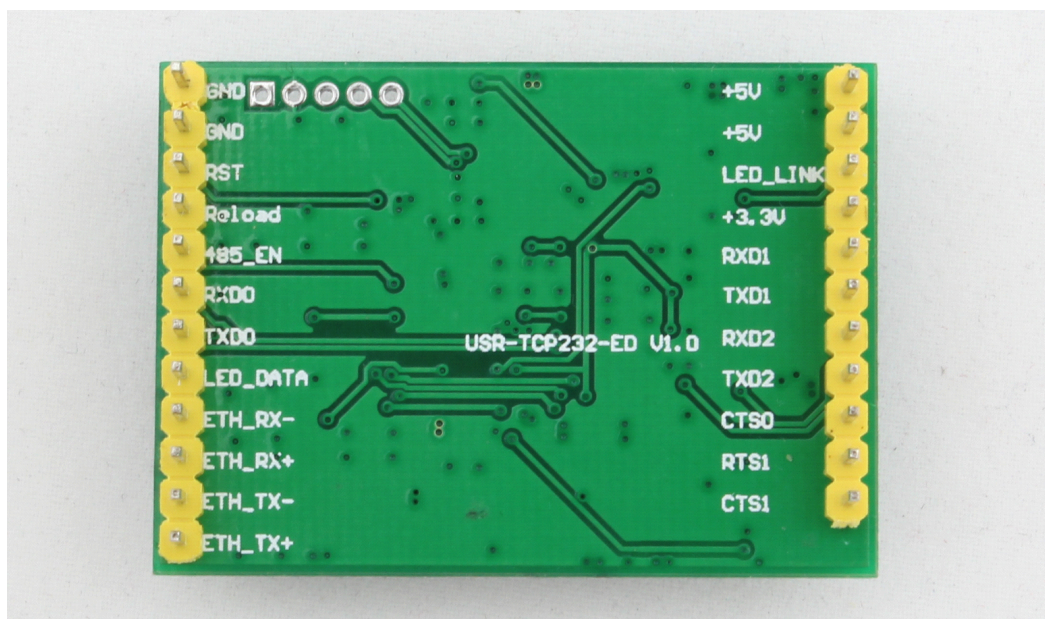


Diagram 3-6 view from bottom

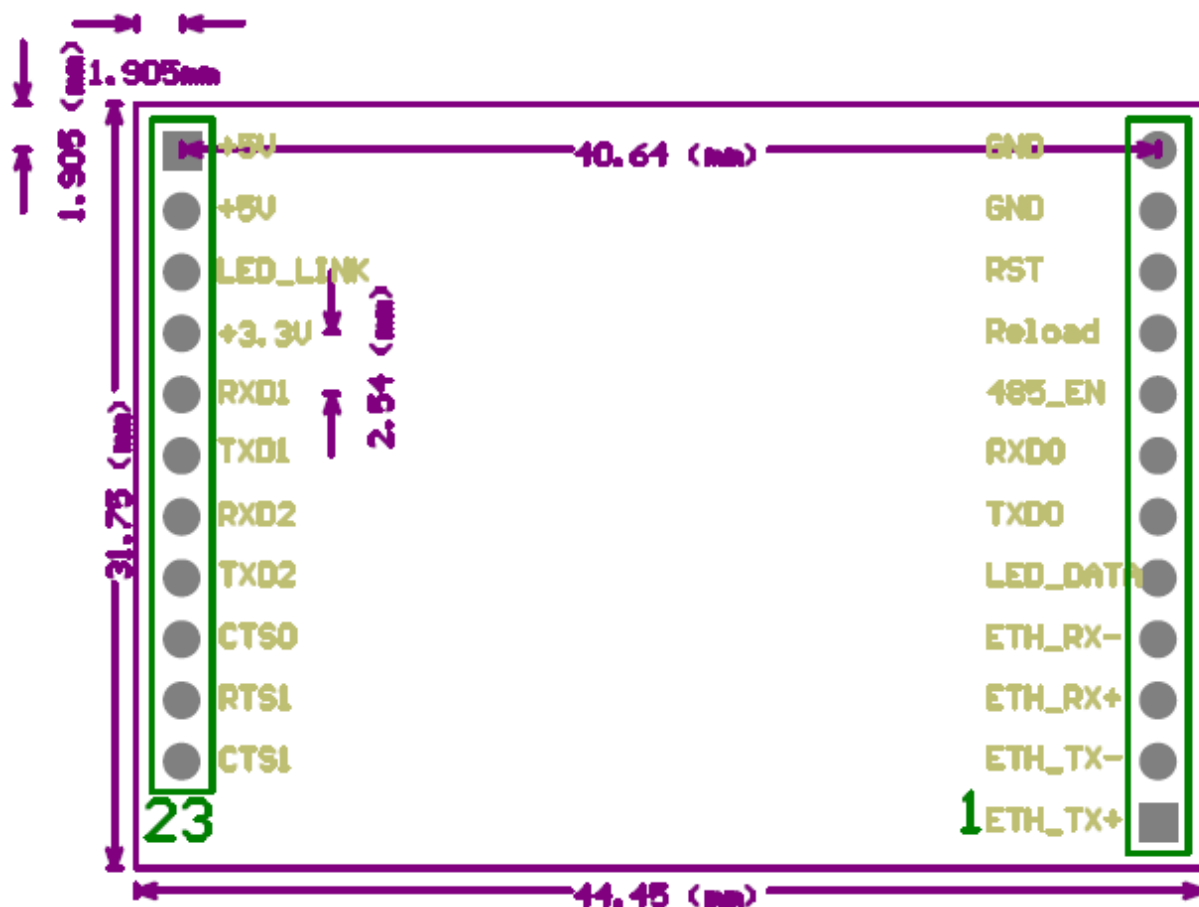


Diagram 3-7 pin diagram

The serial port is TTL level (3 \* TTL serial port, can be directly connected to MCU).

number	name	Description
1	ETH_TX+	Ethernet TX+
2	ETH_TX-	Ethernet TX-
3	ETH_RX+	Ethernet RX+
4	ETH_RX-	Ethernet RX-
5	LED_DATA	Ethernet Data
6	TXD0	Uart0 transmit data pin
7	RXD0	Uart0 receive data pin
8	485_en(RTS0)	RS485 enable (Uart0 require to send)
9	Reload	Restore to factory
10	RST	reset
11	GND	ground
12	GND	ground
13	+5V	+5V power
14	+5V	+5V power
15	LED_LINK	Ethernet link
16	+3.3V	+3.3V power
17	RXD1	Uart1 receive data pin
18	TXD1	Uart1 transmit data pin
19	RXD2	Uart2 receive data pin
20	TXD2	Uart2 transmit data pin
21	CTS0	Uart0 RS232 clear to send
22	RTS1	Uart1 require to send
23	CTS1	Uart1 RS232 clear to send

Diagram 3-8 connector interface(include uart0, uart1, uart3)

Note:

- 1) Uart2 have no RTS and CTS

### 3.3. USR-TCP232-400

#### 3.3.1. Hardware



Diagram 3-9 USR-TCP232-400

- 1) Mechanical dimension: (L×W×H): 90×84×25(mm) including RJ45 and connector;
- 2) PCB dimension(L×W): 80.3×50.3(mm);
- 3) +5 ~ +18V power input;
- 4) DC power plug, 5.08 connector power input
- 5) 2 \* serial(1 \* RS232, 1 \* RS485/422)
- 6) 1 \* RS232 support hardware flow control
- 7) 1 \* RS485/RS422
- 8) Specific: PIN 9 of the RS232 DB9 can connect to power for special uses.

#### 3.3.2. Power

This system has three power supply interface, a power hub, a 5.08 terminal, pin 9 of the two serial com (through the PCB jumper short circuit, default closed).



Power supply socket, outer diameter 5.5 mm inner 2.1 mm standard size, inside plus, outside minus. The input voltage range 5 ~ 18 V, current 150 MA. We default supply high quality 5 V / 1 A power adapter.

Power supply socket, the terminal and pin 9 of the com, mutual unicom, can choose one power supply in, and another power supply out, better adapt to the use environment.

### 3.3.3. LED status

Equipment have 4 indicator lights in total, sequence from left to right.

ID	Name	Description
1	Power(red)	Bright after power on
2	Work(green)	Flash at work
3	Link(green)	In RJ45 port, bright after network connection
4	Data(yellow)	In RJ45 port, flash if there are datas on network

Diagram 3-10 LED definition

### 3.3.4. RS232 interface

The serial port is male (needl), RS232 level (can be directly connected to computer serial), part of RS232 pin sequences consistent to computer COM port. When connected with the computer, we need to use cross cable (2-3 cross, 7-8 cross, 5-5 direct, 7-8 can don't connect, but musn't directly connect to computer. Otherwise, it might lead to irregularly work).

The DB9 interface contains the RS232, RS485 and RS422 interfaces.

Number	RS232	RS485	RS422	Description
1	-	B(-)	TX-	RS485 minus or RS422 transmit minus
2	RXD	-	-	RS232 device receive data pin
3	TXD	-	-	RS232 device transmit data pin
4	-	-	RX-	RS422 receive minus
5	GND	GND	GND	Signal ground
6	-	A(+)	TX+	RS485 plus or RS422 transmit plus
7	RTS	-	-	RS232 require to send
8	CTS	-	-	RS232 clear to send
9	-	-	RX+	RS422 receive plus

Diagram 3-11 DB9 interface

Note: this DB9 interface include RS232 and RS485/RS422.

### 3.3.5. RS485/RS422 Interface

RS485 two wirings terminal, A (DATA +), B (DATA), when connected with RS485, A (+) to A (+), B (-) to B (-).

RS422 interface also connected to RS232 nine needles binding post. The device have RS232 and RS485 interface, but can only use one in a time, autoadaptation, connect as RS485 is RS485 function, connect as RS422 wiring is RS422 function.

## 3.4. USR-TCP232-401

### 3.4.1. Hardware



Diagram 3-12 USR-TCP232-401

- 1) Mechanical dimension: (L×W×H): 90×84×25(mm) including RJ45 and connector;
- 2) PCB dimension(L×W): 80.3×50.3(mm);
- 3) +5 ~ +18V power input;
- 4) DC power plug, 5.08 connector power input
- 5) 2 \* serial(1 \* RS232, 1 \* RS485)
- 6) 1 \* RS232 support hardware flow control
- 7) 1 \* RS485



### 3.4.2. Power

This system has three power supply interface, a power hub, a 5.08 terminal.

Power supply socket, outer diameter 5.5 mm inner 2.1 mm standard size, inside plus, outside minus. The input voltage range 5 ~ 18 V, current 150 MA. We default supply high quality 5 V / 1 A power adapter.

### 3.4.3. LED status

Equipment have 4 indicator lights in total, sequence from left to right.

ID	Name	Description
1	Power(red)	Bright after power on
2	Work(green)	Flash at work
3	Link(green)	In RJ45 port, bright after network connection
4	Data(yellow)	In RJ45 port, flash if there are datas on network

Diagram 3-13 LED definition

### 3.4.4. RS232 interface

The serial port is male (needl), RS232 level (can be directly connected to computer serial), part of RS232 pin sequences consistent to computer COM port. When connected with the computer, we need to use cross cable (2-3 cross, 7-8 cross, 5-5 direct, 7-8 can don't connect, but musn't directly connect to computer. Otherwise, it might lead to irregularly work).

The DB9 interface contains the RS232, RS485 and RS422 interfaces.

Number	RS232	Description
1	-	-
2	RXD	RS232 device receive data pin
3	TXD	RS232 device transmit data pin
4	-	-
5	GND	Signal ground
6	-	-
7	RTS	RS232 require to send
8	CTS	RS232 clear to send
9	-	-

Diagram 3-14 DB9 interface

### 3.4.5. RS485 interface

RS485 two wirings terminal, A (DATA +), B (DATA), when connected with RS485, A (+) to A (+), B (-) to B (-).

Updated	
Baud Rate:	115200 bits/S
Data Size:	8 bits/character
Parity:	None
Stop Bits:	1 bit(s)
Flow Control:	RS485
Local Telnet Port Number:	None Hardware
Remote Telnet Port Number:	RS485
Work Mode:	TCP Server None Modbus TCP

Diagram 3-15 choose RS485 for 401 if you want to use RS485

## 3.5. USR-TCP232-500

### 3.5.1. Hardware



Diagram 3-16 USR-TCP232-500

- 1) Mechanical dimension: (L×W×H): 155×100×34(mm), including RJ45 and connector
- 2) PCB dimension(L×W): 130.5×90.2(mm);
- 3) +5 ~ +48V power input
- 4) DC power plug, 5.08 connector power input
- 5) 3 \* serial(2 \* RS232, 1 \* RS485/422)
- 6) 2 \* RS232 support hardware flow control
- 7) 1 \* RS485/RS422
- 8) Specific: PIN 9 of the RS232 DB9 can connect to power for special uses.

### 3.5.2. Power

This system has three power supply interface, a power hub, a 5.08 terminal, pin 9 of the two serial com (through the PCB jumper short circuit, default closed).

Power supply socket, outer diameter 5.5 mm inner 2.1 mm standard size, inside plus, outside minus. The input voltage range 5 ~ 48 V, current 150 MA. We default supply high quality 5 V / 1 A power adapter.

Power supply socket, the terminal and pin 9 of the com, mutual unicom, can choose one power supply in, and another power supply out, better adapt to the use environment.

### 3.5.3. LED status

Equipment have 4 indicator lights in total, sequence from left to right.

ID	Name	Description
1	Power(red)	Bright after power on
2	Work(green)	Flash at work
3	Link(green)	In RJ45 port, bright after network connection
4	Data(yellow)	In RJ45 port, flash if there are datas on network

Diagram 3-17 LED definition

### 3.5.4. RS232 interface

It have 2 \* RS232 interface. The serial port is male (needl), RS232 level (can be directly connected to computer serial), part of RS232 pin sequences consistent to computer COM port. When connected with the computer, we need to use cross cable (2-3 cross, 7-8 cross, 5-5 direct, 7-8 can don't connect, but musn't directly connect to computer. Otherwise, it might lead to irregularly work).

The DB9 interface contains the RS232, RS485 and RS422 interfaces.

Number	name	Description
2	RXD	RS232 device receive data pin
3	TXD	RS232 device transmit data pin
5	GND	Signal ground
7	RTS	RS232 require to send
8	CTS	RS232 clear to send
9	VCC	Default not used. there is one pad jumper, default disconnect, when connect, it can power supply outside serial device.

Diagram 3-18 DB9 interface

Note: none

### 3.5.5. RS485/RS422 interface

RS485 two wirings terminal, A (DATA +), B (DATA), when connected with RS485, A (+) to A (+), B (-) to B (-).

RS422 interface also connected to RS232 nine needles binding post. The device have RS232 and RS485 interface, but can only use one in a time, autoadaptation, connect as RS485 is RS485 function, connect as RS422 wiring is RS422 function.

## 3.6. USR-TCP232-504

### 3.6.1. Hardware



Diagram 3-19 USR-TCP232-504

- 1) Mechanical dimension: (L×W×H)95×85×25(mm), including RJ45 and connector;
- 2) PCB dimension(L×W): 80×50(mm);
- 3) +5 ~ +18V power input;
- 4) DC power plug, 5.08 connector power input
- 5) 3 \* serial(3 \* RS485)

### 3.6.2. Power

This system has three power supply interface, a power hub, a 5.08 terminal.

Power supply socket, outer diameter 5.5 mm inner 2.1 mm standard size, inside plus, outside minus. The input voltage range 5 ~ 48 V, current 150 MA. We default supply high quality 5 V / 1 A power adapter.

### 3.6.3. LED status

Equipment have 4 indicator lights in total, sequence from left to right.

ID	Name	Description
1	Power(red)	Bright after power on
2	Work(green)	On PCB board(can not be seen)
3	Link(green)	In RJ45 port, bright after network connection
4	Data(yellow)	In RJ45 port, flash if there are data on network

Diagram 3-20 LED definition

### 3.6.4. RS485 interface

RS485 two wirings terminal, A (DATA +), B (DATA), when connected with RS485, A (+) to A (+), B (-) to B (-).

## 3.7. USR-TCP232-52E

### 3.7.1. Hardware

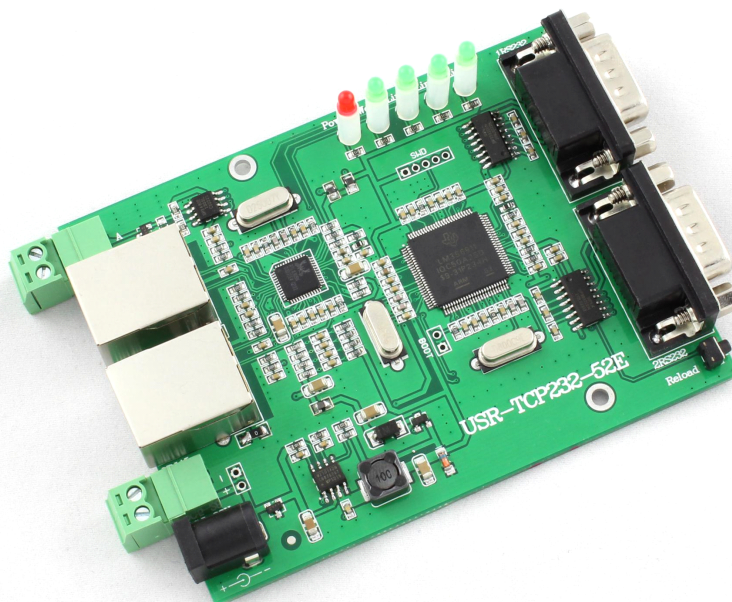


Diagram 3-21 USR-TCP232-52E

- 1) Mechanical dimesion: (L×W×H): 103×105×28(mm);

- 2) PCB dimension(L×W): 100×76(mm);
- 3) DC+5 ~ +28V power input;
- 4) DC power plug, 3.81 connector power input;
- 5) 3 \* serial(2 \* RS232, 1 \* RS485);
- 6) 2 \* RS232 support hardware flow control;
- 7) 1 \* RS485;
- 8) Specific: PIN 9 of the RS232 DB9 can connect to power for special uses;
- 9) 2\*RJ45 , 10/100M adaptive,you can take advantage of the free foot cable to achieve 5-28V power supply network port .

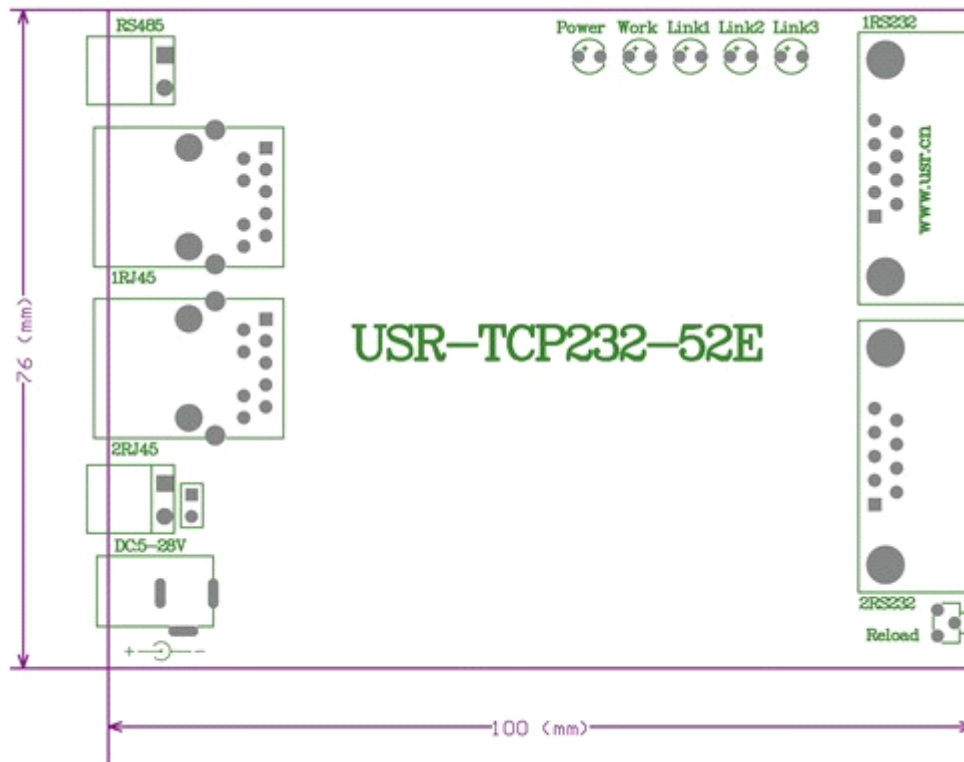


Diagram 3-22 PCB inches

### 3.7.2. Power

This system has four power supply interface, a power hub, a 3.81 terminal, pin 9 of the two serial com (through the PCB jumper short circuit, default closed) and RJ45.

- Power supply socket, outer diameter 5.5 mm inner 2.1 mm standard size, inside plus, outside minus. The input voltage range 5 ~ 28 V . We default supply high quality 5 V / 1 A power adapter.
- 3.81 pitch terminal blocks, terminal external customers through the introduction of 5-28V power supply line.



- Power supply socket, the terminal and pin 9 of the com, mutual unicom, can choose one power supply in, and another power supply out, better adapt to the use environment.
- Network power, you can use an external network cable to supply power to the module, power supply range of 5-28V.



### 3.7.3. LED status

Equipment have 5 indicator lights in total, sequence from left to right.

ID	Name	Description
1	Power(red)	Bright after power on
2	Work(green)	Flash at work
3	Link1(green)	In RJ45 1 port, bright after network connection
4	Link2(green)	In RJ45 2 port, bright after network connection
5	Link3(green)	bright after network connection module

Diagram 3-23 LED definition

### 3.7.4. RS232 interface

It have 2 \* RS232 interface. The serial port is male (needl), RS232 level (can be directly connected to computer serial), part of RS232 pin sequences consistent to computer COM port. When connected with the computer, we need to use cross cable (2-3 cross, 7-8 cross, 5-5 direct, 7-8 can don't connect, but musn't directly connect to computer. Otherwise, it might lead to irregularly work).

The DB9 interface contains the RS232.

Number	name	Description
2	RXD	RS232 device receive data pin
3	TXD	RS232 device transmit data pin
5	GND	Signal ground
7	RTS	RS232 require to send
8	CTS	RS232 clear to send
9	VCC	Default not used. there is one pad jumper, default disconnect, when connect, it can power supply outside serial device.

Diagram 3-24 DB9 interface

### 3.7.5. RS485 interface

RS485 two wirings terminal, A (DATA +), B (DATA), when connected with RS485, A (+) to A (+), B (-) to B (-).

### 3.7.6. RJ45 interface

With two network interfaces, can be achieved hand in hand communications equipment.  
While supporting DC5-28V POE power supply network cable, reducing the power supply wiring.

## 3.8. USR-TCP232-52PE

### 3.8.1. Hardware

- 1) Mechanical dimesion: (L×W×H): 103×105×28(mm);
- 2) PCB dimension(L×W): 100×76(mm);
- 3) DC+5 ~ +28V power input;
- 4) DC power plug, 3.81connector power input;
- 5) 3 \* serial(2 \* RS232, 1 \* RS485);
- 6) 2 \* RS232 support hardware flow control;
- 7) 1 \* RS485;
- 8) 2\*RJ45 , 10/100M adaptive,you can take advantage of the free foot cable to achieve 5-28V power supply network port .

### 3.8.2. Power

Network power supply standard 48V POE.

### 3.8.3. LED status

Equipment have 5 indicator lights in total, sequence from left to right.

ID	Name	Description
1	Power(red)	Bright after power on
2	Work(green)	Flash at work
3	Link1(green)	In RJ45 1 port, bright after network connection
4	Link2(green)	In RJ45 2 port, bright after network connection
5	Link3(green)	bright after network connection module

Diagram 3-25 LED definition

### 3.8.4. RS232 interface

It have 2 \* RS232 interface. The serial port is male (needl), RS232 level (can be directly connected to computer serial), part of RS232 pin sequences consistent to computer COM port. When connected with the computer, we need to use cross cable (2-3 cross, 7-8 cross, 5-5 direct, 7-8 can don't connect, but musn't directly connect to computer. Otherwise, it might lead to irregularly work).

The DB9 interface contains the RS232.

Number	name	Description
2	RXD	RS232 device receive data pin
3	TXD	RS232 device transmit data pin
5	GND	Signal ground
7	RTS	RS232 require to send
8	CTS	RS232 clear to send

Diagram 3-26 DB9 interface

### 3.8.5. RS485 interface

RS485 two wirings terminal, A (DATA +), B (DATA), when connected with RS485, A (+) to A (+), B (-) to B (-).

### 3.8.6. RJ45 interface

Two network communication interface, accepting 1,2,3,6 and 4,5,7,8 standard in two methods PSE.

## 3.9. RJ45 interface

Internet access port connection, module network interface is 10 M / 100 M adaptive, support AUTO MDI/MDIX, can discretionarily connect cross-over or direct network cable. That is to say, you can use direct cable to connect with computer or test.

Pin	Name	Description
1	TX+	Transceiver Data+
2	TX-	Transceiver Data-
3	RX+	Receive Data+
4	n/c	Not connected
5	n/c	Not connected
6	RX-	Receive Data-

7	n/c	Not connected
8	n/c	Not connected

Diagram 3-27 RJ45 interface

### 3.10. Reload

This button is used to restore factory settings. Press the button and power on, then free this Reload button, device will be factory settings.

Default settings main parameters as follows

Address type: static IP

Static IP Address: 192.168.0.7

User name: admin

password: admin

Module name: USR-TCP232-E

Using web pages can also restore default settings.

#### Restore Factory Defaults

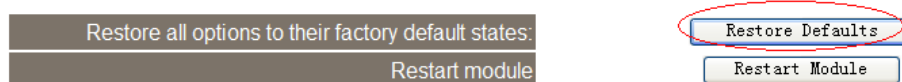


Diagram 3-28 restore defaults through web pages

## 4. Paramters configuration

### 4.1. Web page

Usually, this series of TCP232 module is configured through web pages.

### 4.2. Serial port

After module already power on, press Reload(for USR-TCP232-E, pull Reload low), module will go in Serial config mode(in this mode we can config paramters through serial command), then module serial port 0 will switch to 9600, 8, n, 1, and send char 'U', indicating that module already in serial config mode.

after config complete, module will send 'K' out, indicating config success;

Verify error will be 'E' and correct verify byte.

Free Reload(for USR-TCP232-E, pull Reload high), module will save paramters and reboot, config take effect.

name	Byte	Description	example	Hex(low front)
------	------	-------------	---------	----------------

head	2	Head(55 BA/55 C1/55 C2)	55 BA	55 BA
Target IP	4	Target IP	192.168.0.201	C9 00 A8 C0
Target port	2	Target port	8234	2A 20
Module IP	4	Module IP	192.168.0.7	07 00 A8 C0
Module port	2	Module port	20108	8C 4E
gateway	4	Gateway IP	192.168.0.201	C9 00 A8 C0
Work mode	1	1 for TCP Client;0 for UDP; 2 for UDP Server; 3 for TCP Server	TCP Client	01
Baud rate	3	Serial baud rate	115200	00 C2 01
serial param	1	Databits, stopbits, verifybits	N,8,1	03
Unique ID	3	ID-H, ID-L, ID-type, 0 for no use	No use	00 00 00
Subnet mask	4	Subnet mask, low front	255.255.255.0	00 FF FF FF
Sum verify	1	Sum verification, from target ip until end (sum itself not included)	sum	B9
Total cmd: 55 BA C9 00 A8 C0 2A 20 07 00 A8 C0 8C 4E C9 00 A8 C0 01 00 C2 01 03 00 00 00 00 FF FF FF B9				

Diagram 4-1 protocol structure and example

Note.

1. Head definition.

55 BA for write Port0, 55 BC for read port0;

55 C1 for write Port1, 55 C3 for read port1;

55 C2 for write Port2, 55 C4for read port2(Port2 only for-500).

2. For further information, see <USR-TCP232-XX config protocol V3.doc>.

### 4.3. network command(setup software)

1. through software USR-TCP232-E45 Setup V1.0.5.0;

2. Network command(need to ask for protocol before purchasing).

Downbelow is the Setup for USR-TCP232-E45, <http://www.usr.so/Download/90.html>

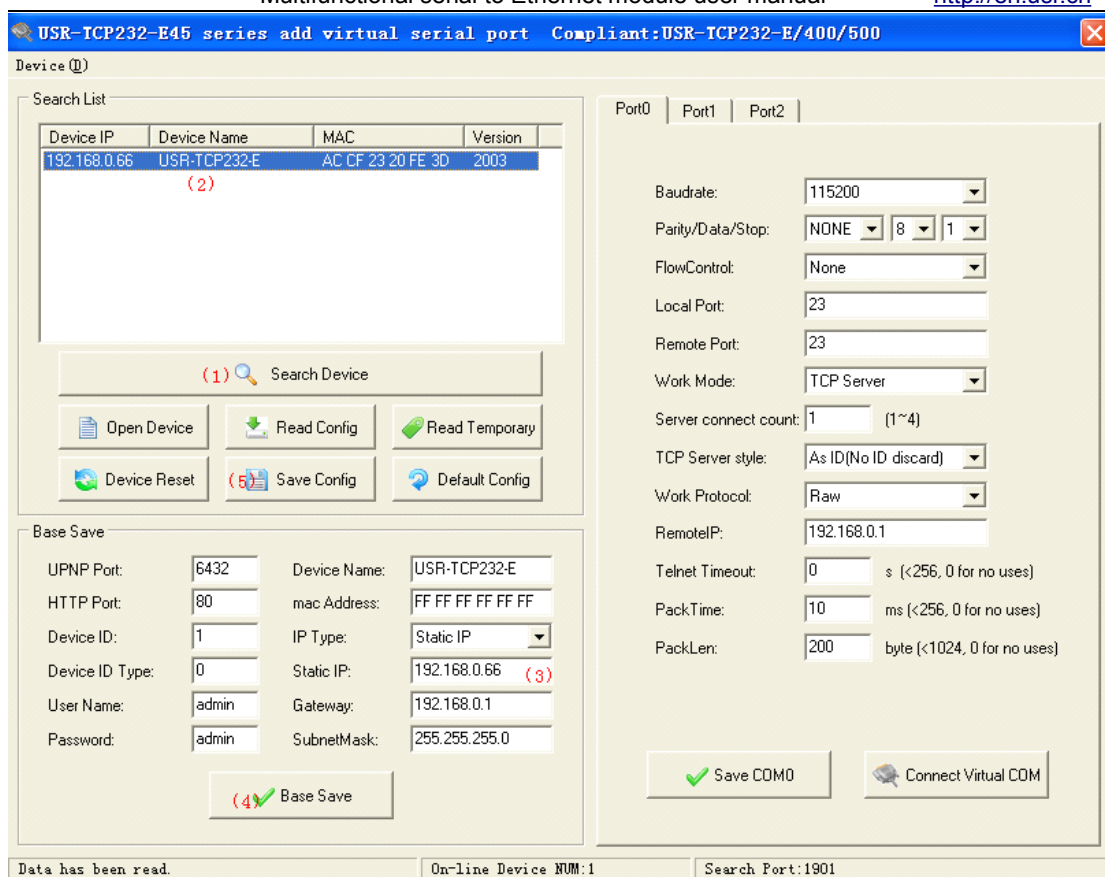


Diagram 4-2 Setup software

- (1)click 'Search Device';
- (2)Select device in search list;
- (3)Modified paramters such as static ip;
- (4)Click 'Base Save', paramters will be saved;
- (5)Click 'Save Config', the paramters will take effect;
- (6)Search again, module will appear in new paramters.

Note.

After modified paramters, need first 'Base Save' or 'Save COMX', then 'Save Config'.  
If not, the paramters will only be saved, but not take effect.


## 5. Specific functions

### 5.1. ModbusRTU to ModbusTCP

The whole series product support ModbusRTU to ModbusTCP. When you use it, you have to select the protocols, just here:

Port0
Port1
Port2

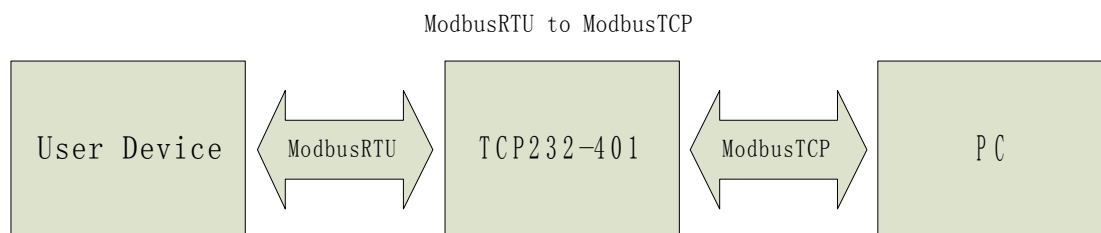
Baudrate: 115200 (?)  
Parity/Data/Stop: NONE 8 1 (?)  
FlowControl: RS485 (?)  
Local Port: 23 (?)  
Remote Port: 23 (?)  
Work Mode: TCP Client (?)  
Server connect count: 8 (1~8) (?)  
TCP Server style: Transparent transmissio (?)  
ModbusTCP: ModbusTCP (?)  
RemoteIP: None (?)  
PackTime: 10 ms (0~255) (?)  
PackLen: 512 byte (0~1023) (?)  
☒ Synchronize baudrate(RFC2217 similar) (?)



Here, the usement and function is presented below.

- Selection None, that indicate we are using Transparent mode, no protocol conversion.
- Selection ModbusTCP, means we use protocol conversion from Modbus RTU to ModbusTCP.
- In the comm side(RS232 or RS485), it's ModbusRTU protocol , the ethernet side is ModbusTCP.
- The ethernet side must be a Master, who send query frame first, and the Modbus RTU device respond with data to the command.

The function acts as below.



## 5.2. Hardware flow control

RS232 interface support hardware flowcontrol (RTS/CTS)

Pin name	Description	IO type	Operater
RTS	Request to Send	O	module
CTS	Clear to Send	I	Outside device(PC)

Diagram 5-1 Pin description

When RTS = 0, enable the other side to send, at this time, TTL is 0 volt, RS232 is -3V ~ -15V;

When CTS = 0, represent module is enabled to send, at this time, TTL is 0 volt, and RS232 is -3V ~ -15V;

When the logic is reverse, represent that disable the other side to send or was disabled the module to send.

When connect with PC's RS232 interface, we can use the serial cable(cross).

## 5.3. User MAC address

User MAC address default is 6 bytes of 0xff, that is: FF-FF-FF-FF-FF-FF,

If defaults, use the factory MAC address such as: ac- cf-23-20-fe-3d;

If not, user MAC address will take effect.

When modify this address, insert '-' between bytes, or insert nothing. Click 'Update Settings' to save parameters, reset to take effect.

### General Configuration Settings

Module Name:	USR-TCP232-E	
UPnP port number:	6432	
HTTP server port number:	80	
Module Id(use for indentify modue):	1	(1~65535)
Module Id type(0:no use, 1:send id when connect, 2:send id when send data, 3:both):	0	(0/1/2/3)
MAC Address(User)	ff-ff-ff-ff-ff-ff	
<input type="button" value="Update Settings"/>		

Diagram 5-2 user MAC address

In Current config and status, can see the currently MAC address in use. Diagram below is using the factory MAC.




## Status and Configuration

Name:	USR-TCP232-E
Firmware Revision:	2003
IP Address:	192.168.0.7
MAC Address in use:	ac-cf-23-21-00-25

Diagram 5-3 currently MAC in use

## 5.4. Firmupdate

Use search and config software  **USR-TCP232-E45 V1.0.5.0** to update firmware, only once for one time, can not cross network segment.

1. Search and select one module

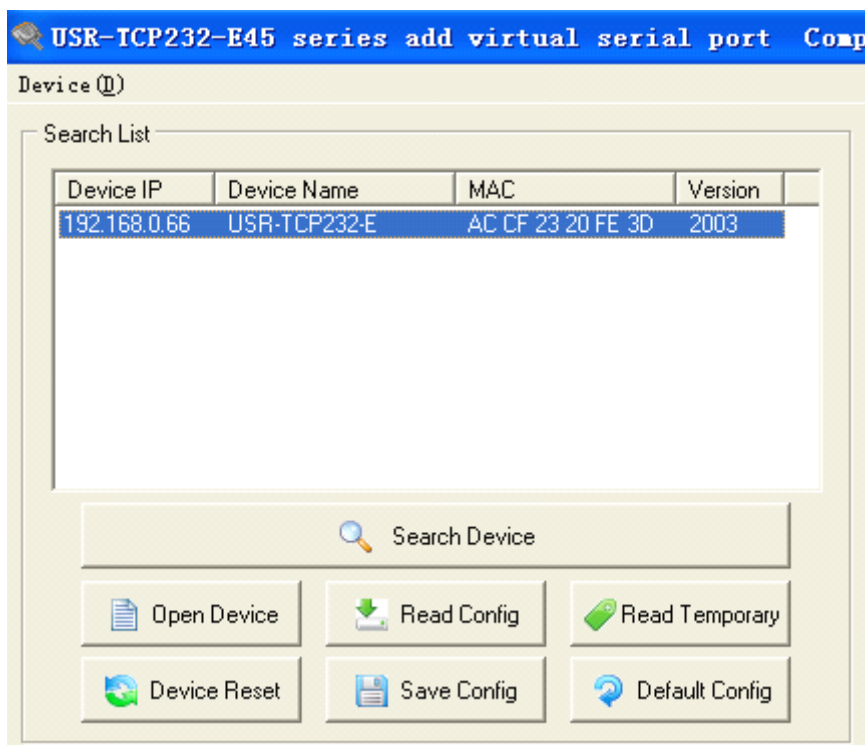


Diagram 5-6 search and select

2. 'Device' -> firmware update

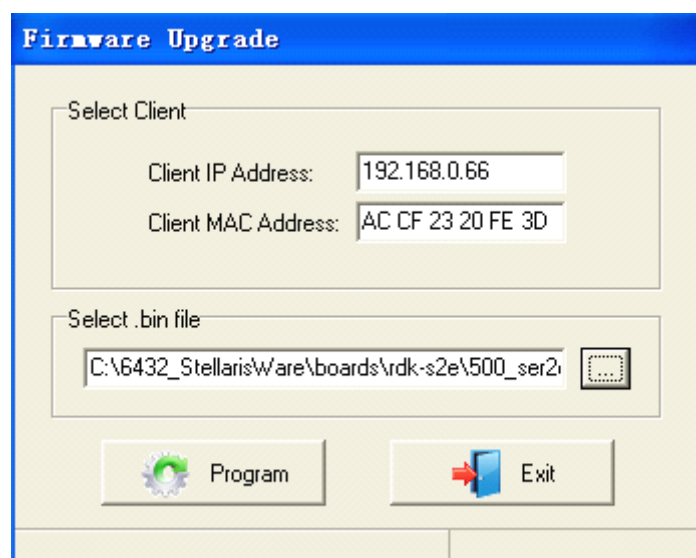



Diagram 5-7 firmware update

Click  Program to start update progress.

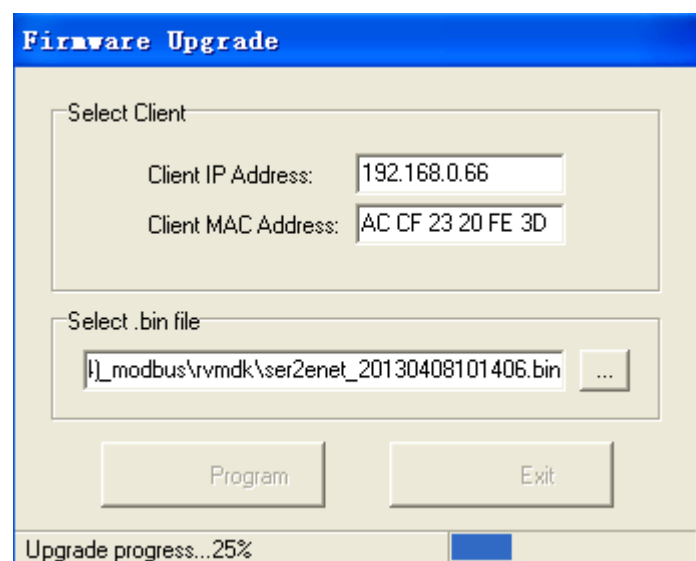


Diagram 5-8 in update progress

3. Update success, click exit.

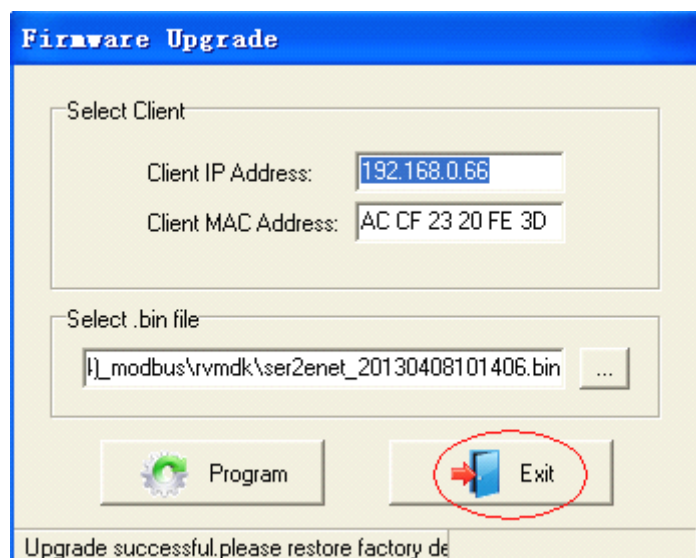


Diagram 5-9 success

Note. After update, if can not search module, restore to factory will fix this problem.

## 6. Module USES

### 6.1. Hardware connection

For the convenience of use, we designed evaluation board for module USR-TCP232-E, with the RS232 to TTL conversion circuit, convenient for user communicate with computer.

Here we take USR-TCP232-E for example, The default configuration:

IP address: 192.168.0.7

Subnet mask: 255.255.255.0

The default gateway: 192.168.0.1

#### IP Address Selection

Address Type:	Static IP
Static IP Address:	192 . 168 . 0 . 7
Subnet Mask:	255 . 255 . 255 . 0
Default Gateway:	192 . 168 . 0 . 1
<input type="button" value="Update Settings"/>	

Diagram 6-1 IP Address Selection

To test briefly, you can connect the module with computer via network cable, or you can also connect the module and computer to switch or router at the same time. No need to distinguish

cross and direct connect cable, the module have automatic switch function. And, change computer IP to 192.168.0. \*, such as 192.168.0.161 we test.

Connect the module serial to computer through TTL to RS232 turn wiring. if you use TTL to USB turn wiring, please pay attention to the quality of the turn wiring, most low price USB turn TTL module on market is low quality at present.

Power up, 5 V connect to VDD or 3.3 V connect to VCC, keep the voltage stable, 150 MA current at least.

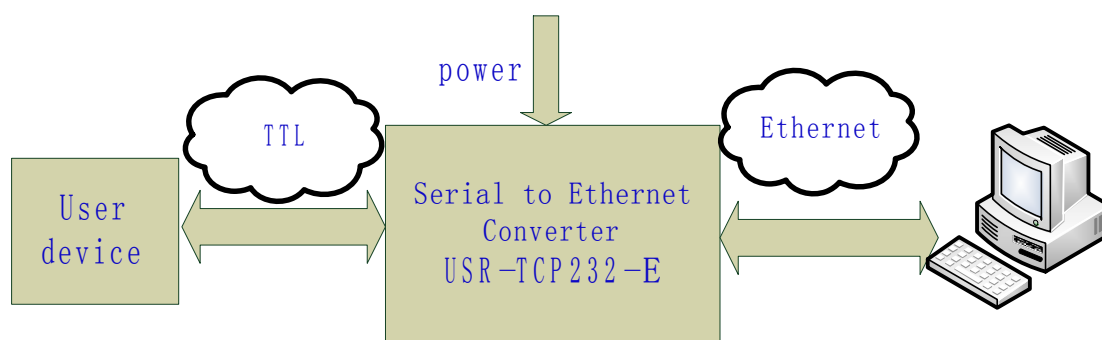


Diagram 6-2 Application

## 6.2. Login

Login above IP address <http://192.168.0.7> through the browser, you will enter setup web pages.

User name and password are “admin”, this can be modified when login into the system.

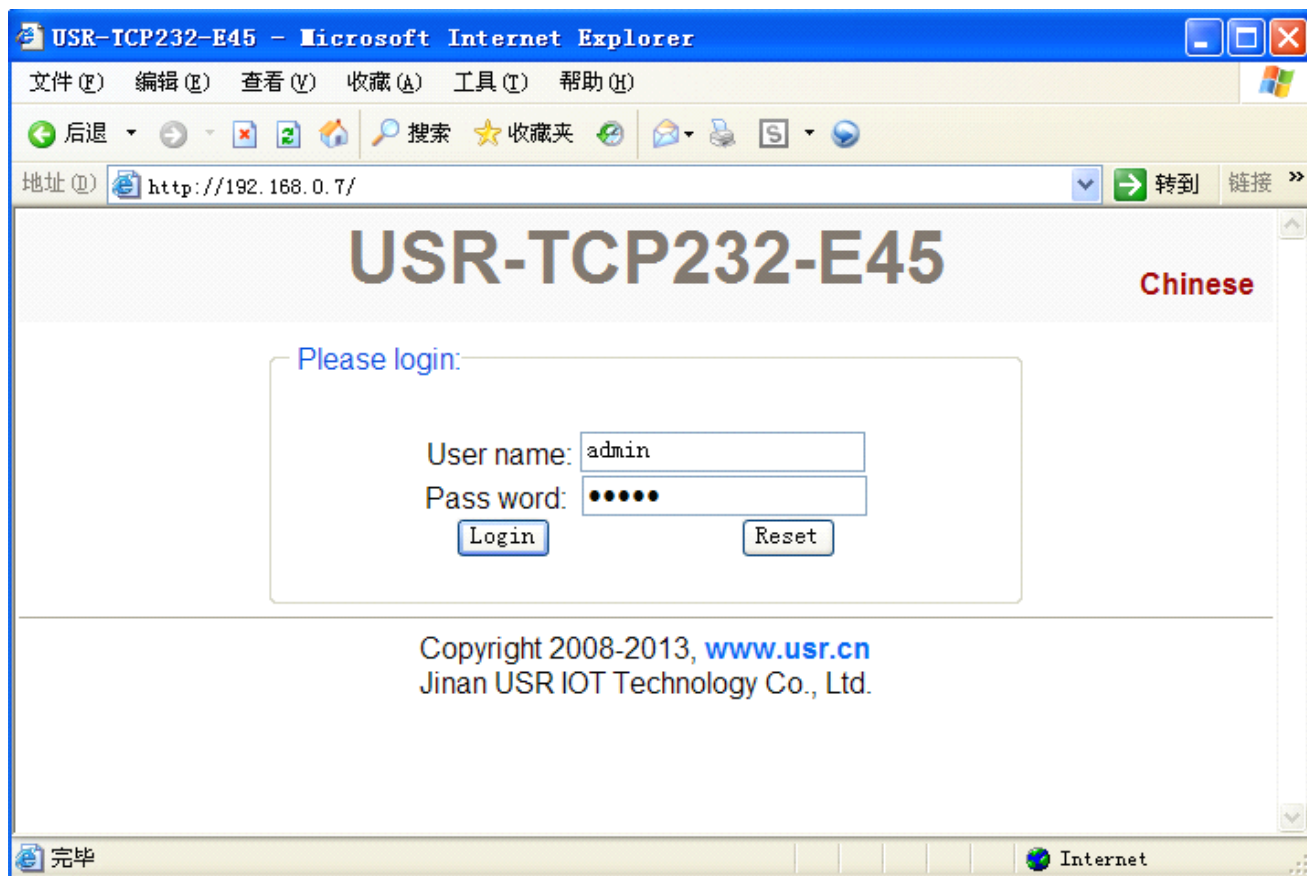


Diagram 6-3 Login web page

Webpage as follows, PORT2 is not available, 2. TTL(uart0) Settings and 3. TTL(uart1) Settings respectively corresponding to UART0 and UART1 Settings, 4. Miscellaneous Settings is used to set some parameters such as module IP and module name.



The screenshot shows the web interface for the USR-TCP232-E module. On the left, there is a navigation menu with the following items:

1. Current config and status
2. Port0 settings
3. Port1 settings
4. Port2 settings
5. Web to Serial
6. Miscellaneous settings

The main content area is titled "IP Address Selection". It contains the following settings:

Address Type:	Static IP
Static IP Address:	192 . 168 . 0 . 7
Subnet Mask:	255 . 255 . 255 . 0
Default Gateway:	192 . 168 . 0 . 1

At the bottom right of the settings area, there is a button labeled "Update Settings".

Diagram 6-4 web page of USR-TCP232-E

Note:

For webpages: PORT0, PORT1 and PORT2, represent below:

TCP232-E/ED: PORT0 represent UART0, PORT1 represent UART1, PORT2 not available;

TCP232-400/401: PORT0 represent RS232, PORT1 represent RS485, PORT2 not available;

TCP232-500: PORT0 and PORT1 represent RS232\_0 and RS232\_1, PORT2 represent RS485/422;

TCP232-504: PORT0, PORT1, PORT2 represent RS485\_0, RS485\_1 and RS485\_2

### 6.3. Default working mode test

To test briefly in default working mode, on the foundation of the hardware connection, use the matched software USR-TCP232-Test to make transmitting and receiving test. The left side is serial port, use software default settings, the right side is the network part, set to TCP Client and server to be IP 192.168.0.7, port 23.

By default, the two COM port to be set as TCP Server mode, port is 23/26.

This illustration shows the 10 ms two-way simultaneous automatically transmit screenshots. As the allocated memory of the display control is limited, in order to test large amount of data transceiver, here will suspend the receive display, only statistical data. Below is the effect after testing for a few hours, and transmitting millions of bytes. Stable and reliable, without a byte loss.

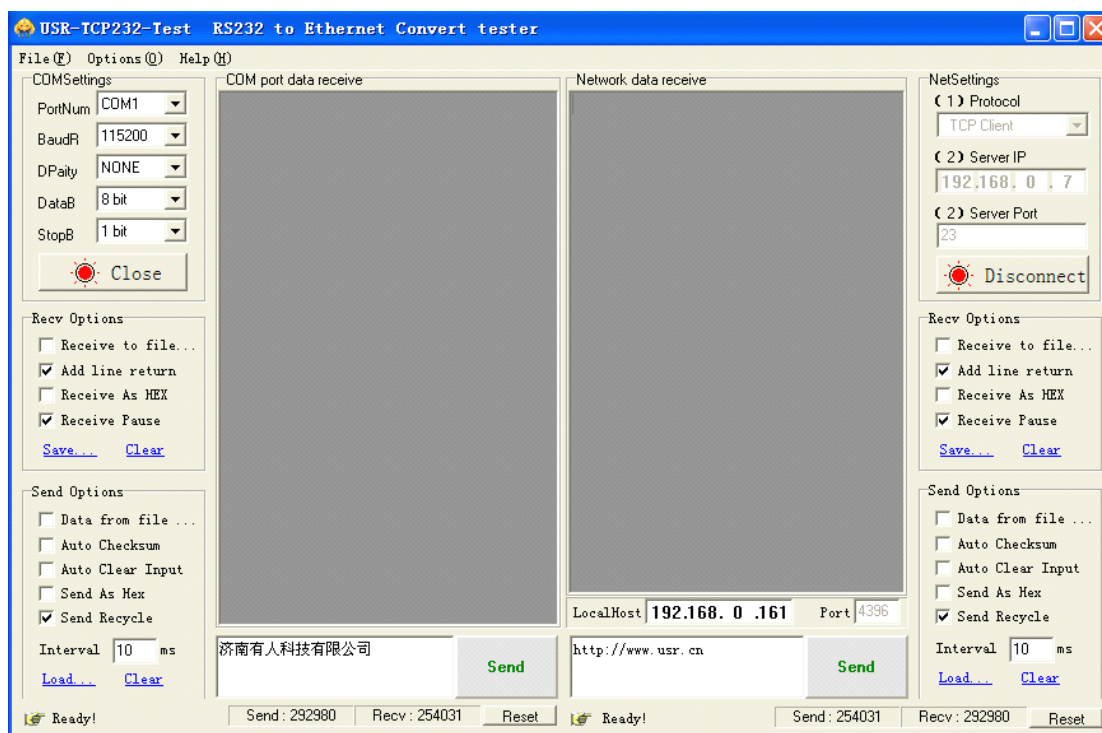


Diagram 6-5 default working mode communication

### Special instruction:

For the robustness of your application system, we suggest you using the time out function (default 0, closed). Such as setting the Telnet Time out, to prevent the complicated internet circumstances influencing communication stability, and solving the off line link, communication feign death, TCP connection to be occupied problems.

In the TCP Server mode, if still have no new data transceiver when it is time out setting time, the module will be active to switch off the client links, release resources, wait for new links, transmitting or receiving data will clear the time.

In the TCP Client mode, if still have no new data transceiver when it is time out setting time, the module will be active to switch off the server links and try to relink.

## 6.4. Common questions

### 6.4.1. Work across network segment

If your TCP232 device's IP is 192.168.0.7, and remote PC's IP is 192.168.1.7, we need to config.



Subnet mask of TCP232 device, PC, and router to 255.255.0.0, if not, the TCP232 module will not communicate normally.

#### 6.4.2. Ping is OK but can not open web pages

Some possible causes

1. Module is set a static ip and conflicts with another ethernet device.
2. Cross network and false subnet mask .
3. HTTP server port is modified(default 80).

Solutions:

1. Set another static or use DHCP.
2. Set correct subnet mask.
3. Set this port to 80 or open web page with correct port.

#### 6.4.3. After firm update, can not open web page

Reload this module back to factory settings.

#### 6.4.4. When connection established, server received serval chars

Possible causes.

- 1) Telnet Protocol use Telnet(usually should be RAW).
- 2) Module id type is not 0.

Telnet Mode:	TCP Client	TCP Client
Telnet Protocol:	Telnet	Telnet
Telnet Server Addr:	192.168.0.161	192.168.0.161
Telnet Timeout:	0seconds	0 seconds (< 256, 0 for infinity)

Diagram 6-6 Telnet Protocol

Module Id(use for identify module):	1	(1~65535)
Module Id type(0:no use,1:send id when connect,2:send id when send data,3:both):	3	(0/1/2/3)

Diagram 6-7 Module id type

Solutions.

- 1) Telnet Protocol choose RAW.
- 2) Module id type set 0.

#### **6.4.5. Every serval seconds, module reconnect**

Telnet Timeout was set to none 0 value.

Solutions

- 1) Give Telnet Timeout 0 or send data before timeout.

## 7. Contact us

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## 8. Modified history

- 1) V1.0 file established
- 2) V1.1 take -E, -400, -500 into one file; add TCP Auto, HTTPD Client and so on.
- 3) V1.2 add Keepalive
- 4) V1.2.1 add -ED, -401, -504
- 5) V1.2.3 add -52E, 52PE
- 6) V1.2.5 modify errors